

## 14.3 Cracking alkanes

Crude oil can be separated into several parts by fractional distillation. The hydrocarbons with the highest boiling points have large molecules and are of limited use. They are 'cracked' to make smaller, more useful, molecules.

### Aim

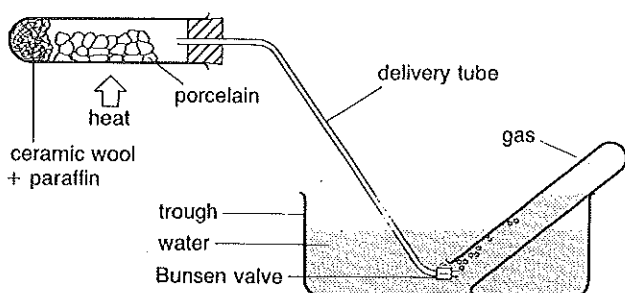
To crack medicinal paraffin, collect the products and test them.

### Apparatus and materials

Hard glass test-tube, 125 × 16 mm  
Three test-tubes with stoppers  
Test-tube rack  
Delivery tube fitted with Bunsen valve  
Bunsen burner and mat  
Ceramic wool  
Broken porcelain  
Stand, boss and clamp  
Trough  
Splints  
Dropping pipette  
Medicinal paraffin (dodecane)  
Universal Indicator paper  
Bromine water  
Potassium manganate(VII)  
Sulphuric acid, 2 mol dm<sup>-3</sup>

### Procedure

#### a) Cracking



- 1 Place a tuft of ceramic wool in the hard glass test-tube. Pack the tuft down to a depth of about 2 cm.
- 2 Use a dropping pipette to drop medicinal paraffin onto the ceramic wool until it is saturated. Pour off any excess paraffin.
- 3 Almost fill the test-tube with pieces of porcelain.
- 4 Clamp the hard glass test-tube and insert the delivery tube attached to a Bunsen valve, used to prevent sucking back. Fill a test-tube with water and place it in the trough over the

delivery tube.

- 5 Heat the porcelain strongly for several minutes.
- 6 Occasionally move the Bunsen flame to heat the ceramic wool.
- 7 Allow the first few bubbles of gas to escape in the trough. Afterwards collect three test-tubes of gas.

#### b) Tests

Perform the following tests on the gas in the test-tubes and then on the medicinal paraffin.

- 1 Note the smell.
- 2 Attempt to light the sample with a splint.
- 3 Add a few drops of bromine water to the sample. Stopper the test-tube and shake the contents. Note any change in colour.
- 4 Prepare a solution of acidified potassium manganate(VII) by mixing equal volumes of dilute sulphuric acid and potassium manganate(VII) solution. Add a few drops of this solution to the sample. Stopper the test-tube and shake the contents. Note any change in colour.
- 5 Add a piece of moist pH paper to the sample.

### Results

Copy and complete the following table:

|   | gas | medicinal paraffin |
|---|-----|--------------------|
| smell                                       |     |                    |
| combustion                                  |     |                    |
| bromine water                               |     |                    |
| acidified potassium manganate(VII) solution |     |                    |
| pH paper                                    |     |                    |

### Questions

- 1 a) Describe the colour of the flame of the burning gas.  
b) What is meant by 'sucking back'?  
c) How does a Bunsen valve work?  
d) Why are the first few bubbles of gas not collected?  
e) In this experiment liquid medicinal paraffin is sometimes formed in the delivery tube. How can this be prevented?